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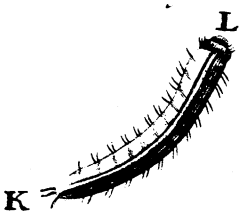

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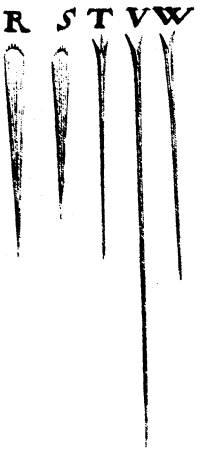

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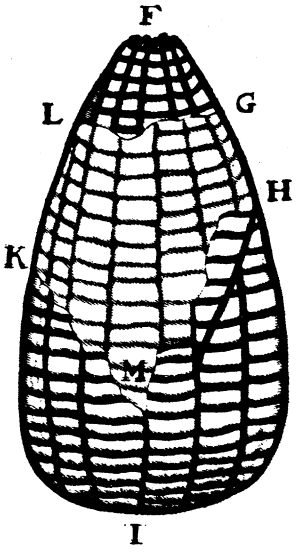

Fig: 12.

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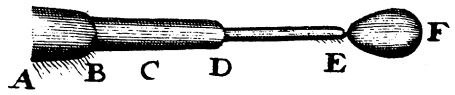

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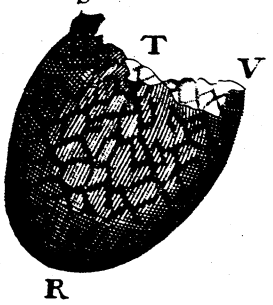

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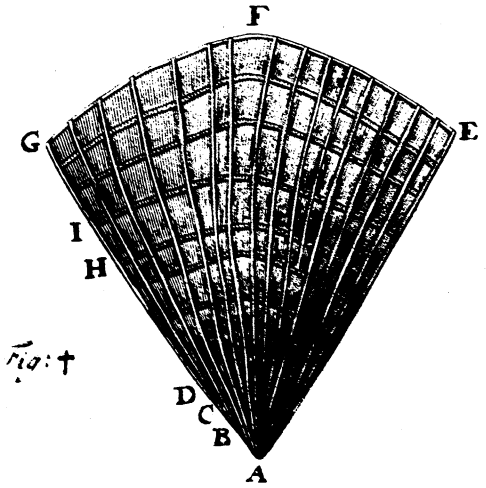

Fig: 1

I. *An Extract of a Letter from Monſieur* Anthony Van Leuwenhock *to the* Royal Society, *containing the Hiſtory of the Generation of an Inſect, by him called,* The Wolf. *With Obſervations on Inſects bred in Rain-Water, in Apples, Cheeſe,* &c.

THE *Wolf* is a ſmall white Worm armed with two red Sheers or Teeth at the fore-part of its Head, wherewith it bores and feeds on the Grains of Corn, and makes its way through Wood it ſelf.

Having formerly often incloſed ſome of theſe Worms with ſome Wheat in ſmall Glaſs Tubes (which I carried in my Pocket in the Winter) I always found that they dyed before the time of Generation: Wherefore in the Summer I put ſome of them with the Wheat whereon they fed in a Box, and obſerved that one of them joyned ſix or eight Grains together, lodging it ſelf in one of them, the reſt being likewiſe all hollow and eat out. The Worm ſpins a Thread, wherewith it joyns the Corn together, and faſtens it ſelf to Glaſs or other ſmooth Bodies. When I put them in Boxes, they eat their way out; and when I put them in Glaſs Tubes, they bored through the Corks that ſtopt the Glaſs Tubes; to prevent which, I covered the Cork with Sealing-wax, and to give them Air, put a very ſmall Glaſs Cane thro' the Wax and Cork. *Fig.* 1. *ABCD* is the Tube ſtopt with Wax and Cork, *EG* and *FH* two ſmall Pipes paſſing through the Cork and Wax. The Beams of the Granaries likewiſe are all eaten, for they leave the Corn, and creep up the Walls to the Timbers of the Ceiling, where they faſten themſelves and remain till their Change.

The

The Worms in my Glaſs Tube, which was about a Foot long, and a Finger wide, faſtened themſelves to the ſides of the Glaſs, and lay ſtill all the Winter; the Web that covered them was ſo thin, that I could with my Microſcope perceive a ſmall motion of their Heads through it.

On the 29*th.* of *April* following they began to look red, and ſomewhat ſhorter than before; on the 30*th.* they were redder, and changed into *Aurelia's*.

On the 23*d.* of *May* they were of a dark red, and on the next day one of them was changed into a ſmall Moth, leaving its uſeleſs Skin, or Winter-coat. This Moth had white Wings with black ſpecks; my Microſcope diſcovered theſe Wings to be covered on both ſides with Feathers, whereof ſome were tipt with black. The Moth had four Wings, each Wing adorned with three rows of Feathers very long in proportion to the little Creature, and each row increaſing in ſize above the other; every Feather was not round at the end, but indented Tooth-like. Theſe Moths are repreſented *Fig.* 2. *A A.* and the Skins they left. *Fig.* 3. *P Q.* of the Natural ſize.

On the 25*th.* of *May* I put into ſeveral Tubes a Male and Female Moth, which might be known aſunder from the Males being ſmaller; and after they had coupled, I opened ſome of the Females, and found between Fifty and Seventy Eggs in each.

On the 26*th.* I found in my fore-mentioned Tube ſix Moths flying; on the 27*th.* I found one Moth had laid nigh Seventy Eggs, each of the ſize of a ſmall Sand, and of the ſhape of an Hens-Egg. The manner of laying their Eggs is by ſtretching out their hinder part, as *Fig.* 4. from *A* to *B*, then thruſting out the Part, *B C D*, and out of that the Part *C D E*, which Extremity is beſet with ſeveral hairs, as at *E* is repreſented: This Part *B C D E* was ſeveral times put out and in, and

at

at laſt it brought forth an Egg which being left, was extended in its paſſing through the narrow paſſage, and the *Ductus* it ſelf enlarged, as *Fig.* 5. *G H I.* I ſuppoſe that it places the Eggs by the means of this long ſlender Member in the creaſes of the Grain, to ſecure them the better from external Injuries. *Fig.* 4. *E.* and 5. *I.* repreſents an Egg when 'tis laid and fixt down by a clamminess it has when new laid: Soon after they had laid their Eggs the Moths dyed.

Thoſe Eggs that were laid on the *26th.* of *May*, by carrying in my Pocket next my Body in a Glaſs Tube, were by too much heat ſpoiled, the Worms that were in them being kill'd; wherefore I put them in a cooler Pocket, and on the third of *June* found ſome of them hatcht, and the Worms creeping on the Glaſs. I cauſed one of theſe to be drawn, but not with all the Curioſity of its Parts, *Fig.* 6. *K L.* The fore-part of this Worm was furniſht with ſix Feet, as is repreſented *Fig.* 7. *M N.* The true ſize of this Worm, when firſt hatcht, was of the length of the line in *Fig.* 8. which was double the Diameter of the Egg.

I gave them ſome Grains of Wheat, wherein they ſoon houſed themſelves: The ſhell of the Egg when the Worm is hatcht is drawn by a much more enlarging Microſcope, *Fig.* 9. *R S T V*, whereon the Net-work of the Veſſels may be ſeen.

I have obſerved that of great numbers of Feathers ſcattered by the Moths they all appeared of a different ſhape and ſize, *Fig.* 10. *A B. C D. E F.* are three of the largeſt Feathers magnified: At the broad end they were ſomewhat blackiſh, ſo that lying one over another, they made a black ſpot. The other Feathers, as *Fig.* 11. *G H. I K. L M.* were white and tranſparent; all theſe Feathers have their Quills, by which they are faſtened into the Membranous Wings: *Fig.* 12. repreſents Ten diſtinct Feathers differing in ſize and ſhape. Thoſe on

the

the edge of the Wing were longer than the others, and of a particular ſhape, *Fig.* 13. ſhews five of them.

Thoſe Eggs which were laid about the 25*th.* of *May*, and were not kept warm, but laid in my Cloſet-window, were not hatcht till about the 10*th.* of *June*; ſo that the warmth of the Body haſtens their hatching.

The Corn-Merchants obſerve them not till about *Auguſt*, though they are hatcht in about ſixteen days after the Moth flies about, and are not perceived by reaſon of their ſmallneſs, and their hiding themſelves in the firſt Grain of Corn that they eat into, and are not ſeen till they quit that for another.

Theſe Worms are not only deſtructive to Corn, but are alſo in old Timber, Books, Boxes, Woollen Stuffs, and the like.

This being ſo Deſtructive and Prolifique an Inſect, for of Seventy Eggs I found but one Barren, and three with dead Worms, I thought of a way to deſtroy them, which is thus: I took a Glaſs Veſſel, and put into it Eight Moths, and firing ſome Brimſtone therein, they were ſoon kill'd by its ſume: and three hours after putting ſome more Moths into the Veſſel, the Scent that remained therein kill'd them; from hence gueſſing at what might ſerve for a larger Room, I took for a Granary 24 Foot long, and 16 broad, ¼ of a Pound of ſuch Brimſtone, prepared ſo as Wine-Coopers uſe to do for their Casks, which (ſecuring it from danger of firing the Room) I placed in the midſt of the Room, and ſetting it on fire, left it, ſhutting the Door, and after two days I came again, and found ſome Moths alive on the Walls, but not a tenth of what uſed to be there, and which I judged might get into the Room through the broken Glaſs of the Window, or they might have crept out of the *Aurelia* after the Smoak was over: Wherefore the beſt way is to ſmoak the Room as ſoon as the Moth appears, and that for ſome days ſucceſſively,

which is but a ſmall charge. And in *Autumn* it would do well to ſweep the Worms off the Walls, for being a tender Inſect, they are eaſily kill'd.

At the time of the Wolfs creeping up the Walls I ſaw many ſmall Animalcules of the ſize of a great Sand upon the Walls alſo; they had their hinder part broad and ſhort like a Louſe, and four Horns, whereof two were almoſt as long as their whole Body, and the other two not above ¼ of that length. Theſe Animalcules laid ſmall Eggs, in ſhape almoſt of a Lemon: They were not long-lived, poſſibly for want of their proper Food, for ſome of them had eaten others for Hunger: Theſe Eggs were hatcht in *May*, and the Young ones were of the ſame ſhape with their Parents, ſo that theſe Inſects produce their like, as do Lice, Mites, Fleas, *&c.*

In Rain-water I obſerved a ſmall red Worm, and two other kinds of very minute Inſects; of thoſe of the larger ſize I judged that 30000 together would not equal a courſe Sand. Theſe I obſerved for ſeveral days, and ſaw them copulate, the larger dragging the ſmaller through the Water after them, ſwimming by the means of very ſmall Fins. I ſaw likewiſe another ſort of ſmaller Inſects in the Water coupled, twenty times more in number than the former.

As to Inſects bred in Apples, I obſerve that in the Spring, when the Trees begin to bud, a certain black Fly lights on the Bloſſoms, and lays its Eggs there, (our Gardiners ſay, they come moſt with a North-wind) others ſay, they come out of the Sea: I took off from a Leaf an Egg laid there by what we call a *Wittge*; it was of the bigneſs of a courſe Sand, its ſhell after the Worm is out, is repreſented *Fig.* 14. *GHMKL* being the part whereat the Worm had made its way: Of this Shell all the Rib-like parts appeared hollow, and moſt likely are Veſſels. This Inſect flies from one Bud to another, and I doubt not but if we did obſerve theſe

black

black Flies, and the Caterpillars which ſoon follow them, we ſhould find that the Caterpillars generated by black Flies, change to black Flies again.

About two Years ſince I put ſome Cheeſe-Maggots in a Glaſs Tube in my Pocket, and at laſt found the Maggot turned to a red *Aurelia* from pure white; and theſe again changed into a black Fly; which Experiment I oft renewed with the ſame ſucceſs, though I could not keep theſe Flies till they laid Eggs, it may be for want of convenient Food.

From theſe and ſeveral other Obſervations, I conclude there is no Generation but from the Parent Animal.

A CATALOGUE *of thoſe Oyls that will take Fire with a great Noiſe and Exploſion, when the Compound Spirit of Nitre is poured upon any of them, and of thoſe Oyls that do only make a great Noiſe with Exploſion, but will not take fire; and alſo of thoſe that do not make either Effervescence or Exploſion. The firſt is marked with two Stars **. The ſecond with one *. The laſt has no mark at all.*

Oyls,

- Eſſential.
  - Vegetable.
    - Perfect Stillations made by the Analyſis of Chymical Fires, where the Oleaginous Particles are truly ſeparated from all other,
      - Carui **
      - Cummin *
      - Fenil *
      - Dills. *

      } Seeds.
    - Light, or Æthereal, which are ſpecifically lighter than Water and Brandy, and ſome than Spirit of Wine, and are uſually drawn from the Seeds of Vegetables: Such as from
      - Juniper *
      - Bay *

      } Berries.
    - Ponderous or heavy, which do commonly ſink in Water, being diſtilled from the heavy Parts either of the Wood or Cortex of Trees. Such as from ☞
      - Thyme *
      - Wormwood *
      - Angelica *
      - Hyſſop *
      - Lavender *
      - Roſemary *
      - Peny-royal *
      - Rue *
      - Sage *
      - Savin. *

      } Tops of Plants.
- Not Eſſential.
  - Imperfect, made by expreſſion, which are decompounded of ſeveral parts of the Plants.
    - Lemons *
    - Oranges *
    - Nutmegs *
    - Cloves **

    } Fruits.
    - As of
      - Almonds
      - Olives
      - Wallnuts

      } Fruits.
      - Line
      - Rape

      } Seeds.

      ☞
      - Saſſafras **
      - Guajacum **
      - Box **
      - Camphire **

      } Wood.
      - *Jamaica* Pepper **
      - Cinamon **

      } Cortex.
  - Animal of
    - Solid Parts
      - Hartſhorn **
      - Man's Skull **
      - Hoofs **
    - Fluids, Humane Blood **
  - Mineral of
    - Amber or *Succinum*.
    - *Petroleum*.
    - *Barbados* Tarr.
    - Bees-Wax.

Spirit of Wine will give ſome flaſhes of Fire.

Balſam of Sulphur, a Compound Body made with Oyl of Turpentine and Brimſtone, if not too thick, will flame.

☞ You have Twelve ſorts of Oyls that do make Ebullition, Exploſion, and Flame; Eighteen, Ebullition and Exploſion without Flame; Four that produce neither; by the Mixture of our Compound Spirit of Nitre.

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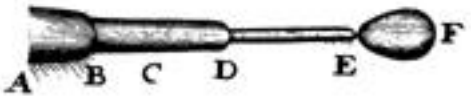

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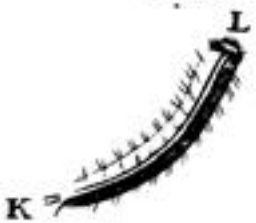

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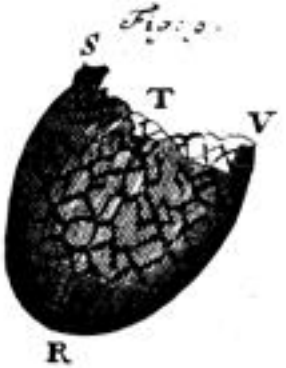

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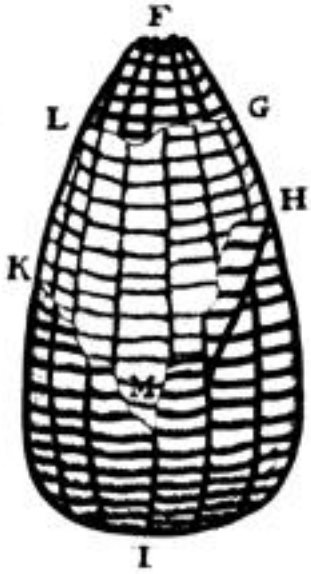

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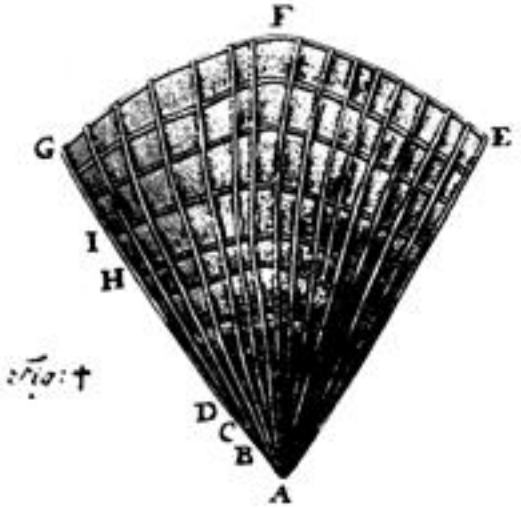
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